Vaidehi Wagh

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Education

Carnegie Mellon University **Expected May 2026**
Master of Science in Robotics | GPA: 4.08/4.0 *Pittsburgh, Pennsylvania*

Coursework: Talking to Robots | Computer Vision | Introduction to Robot Learning | Medical Robotics | Optimal Control & Reinforcement Learning | Math fundamentals for Robotics | TA: Computer Vision, Artificial Intelligence & Machine Learning

College of Engineering, Pune May 2023
B. Tech in Mechanical Engineering | GPA: 8.83/10 *Pune, India*

Research Experience

MetaMobility Lab October 2024 – Present
Graduate Research Assistant | Supervisor: Dr. Inseung Kang *Pittsburgh, PA*

- Deploying **small language models (Phi2, Sheared-LlaMa 3.2)** for **on-edge (Jetson Orin), closed-loop, lower limb exoskeleton control**, enabling real-time personalization based on user feedback and seamless human–robot interaction.
- Developed **temporal convolutional networks** (**PyTorch**) and **simulated a unified IMU dataset** from datasets with **incompatible sensor configurations** using **OpenSim** & **MATLAB** to predict **temporal joint torques** during locomotion.
- Applied **transfer learning** to personalize models for post-stroke individuals, achieving a **27% gain** in prediction accuracy with **< 0.2% subject-specific data**. (*Wagh et al., ASB 2025*)

Neuroplasticity, Imagery and Motor Behaviour Laboratory May 2022 – August 2025
Research Intern | Supervisor: Dr. Sarah Kraeutner *Kelowna, BC*

- Deployed a motion tracking pipeline using **OpenCV and MediaPipe pose estimation** to analyse upper-limb kinematics **(~0.14M actions, ~0.3M frames)** & identify key markers of maladaptive compensation strategies in post-stroke individuals. *(Wagh et al., JNER 2025)*
- Led a validation study comparing low-cost hand tracking to traditional motion capture using shape similarity analysis (**16K fine upper-limb motion trajectories, ~70% accuracy**) demonstrating a scalable solution for monitoring fine motor movements in clinical settings. (*Wagh et al., JMIR 2024).*

Professional Experience

Deloitte Touche Tohmatsu Ltd August 2023 – June 2024
Financial Analyst *Pune, India*

- Built cloud-based pipelines and visualization tools for **large-scale financial time-series data**, implementing temporal forecasting and analytics to automate reporting and generate actionable insights.

LightRay Technologies – *Early-stage startup* November 2022 – May 2023
Computer Vision Intern *Pune, India*

- Fine-tuned a Tiny-YOLOv4 model in PyTorch on a custom 12k image dataset, achieving **94.6%** class-wise accuracy to improve **real-world object detection** in complex driving environments.

Projects

LLM based human-robot voice interface – *Talking to Robots* August 2025 – Present

- Developed a human-robot interface using **speech and vision inputs to finetune a mini VLM** to enable long-horizon planning and execution of user-personalized lower limb exoskeleton control.

Automated IV insertion Bot – *Medical Robotics* August 2025 – Present

- Designed linear-actuation mechanisms for needle insertion (**Inventor**), integrating Arduino control, computer vision-based vein localization (**OpenCV**), and control algorithms for the robot arm.

Generative Adversarial Imitation Learning – *Introduction to Robot Learning* January 2025 – April 2025

- Applied inverse reinforcement learning with **GAN-based reward models** to simulate human locomotion, exploring both state-level and trajectory-level GAIL approaches.

Skills

Programming & ML: Python (PyTorch, Llama-cpp, OpenCV, Scikit-learn), R, MATLAB, Julia | **Data & Biomechanics:** Temporal analysis, wearable sensors, human motion, torque estimation | **Embedded:** Nvidia Jetson, Arduino, ESP32, Raspberry Pi | **Design & Simulation:** SolidWorks, Fusion 360, Inventor, AutoCAD, OpenSim, MuJoCo